

U.S. Patent Application Serial No. 10/510,396
Reply to Office Action dated May 31, 2005

Remarks

Reconsideration is respectfully requested in view of the above amendments and following remarks. Claims 2, 3, 6, 8, 13, 15 and 19 have been amended. New claims 21-26 incorporate limitations recited in original claims 2, 3, 6, 8, 13 and 15 respectively. No new matter has been added. Claims 1-26 are pending.

Applicants appreciate the indication of allowable subject matter in claim 5.

Claim Objections

Claim 2, 3, 6, 8, 13 and 15 are rejected under 37 CFR 1.75(c) as being improper in view of the recitation of "preferably". Applicants respectfully traverse this objection. Claims 2, 3, 6, 8, 13 and 15 have been amended. Withdrawal of this objection is respectfully requested.

Claim rejections 35 U.S.C. §103

Claims 1-4 and 6-20 are rejected under 35 USC 103(a) as being unpatentable over Hesse et al. (US 2003/157286) in view of Baren et al. (ISSN: 0322-7340) and further in view of Jarrin et al. (US 5,218,916). Applicants respectfully traverse this rejection.

Claim 1 is directed to a syntactic polyolefin composition for pipe coating. In the context of the present invention, syntactic polyolefin refers to a composite of polyolefin and filler materials wherein the filler material comprises microspheres. See page 1, lines, 25-26. Claim 1 recites the syntactic polyolefin composition comprises a β -nucleated propylene polymer comprising 0.0001-2.0 weight% of a β -nucleating agent and microspheres. Claim 1 further recites the syntactic polyolefin composition has an elongation at break of at least 3%.

The water pressure on pipe coating can be substantial, and without sufficient compression strength the insulating coating will be compressed to a smaller thickness, thereby reducing its insulating capacity. Additionally, excellent mechanical properties are required for coated pipes in order to avoid cracking of the coating during installation handling and in service. See page 2,

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lines 4-11. Installation of coated pipes subjects the protective coating to a harsh conditions, i.e. high stress, substantial elongation, surface damages, notches, impact events, low and high temperature conditions and high hydrostatic pressure. The coating layer is not only protecting the pipeline as such, but is also doing so in a state of high stress and/or at elevated temperatures and pressures, making the coating more sensitive to cracking, e. g. stress induced during coiling and uncoiling. See page 2, lines 16-26.

Advantageous thermal and mechanical properties have been discovered for syntactic polyolefins (i.e. composite polyolefin/microspheres of the present claims) by the incorporation of a β -nucleating agent. For example, the claimed syntactic polyolefin composition of the present invention is a sufficiently ductile material with improved flexibility and consequently is a material that exhibits the ability to endure handling, such as coiling or reeling of a pipe without the formation of cracks. This ability is evidenced by the claimed syntactic polyolefin composition displaying an elongation at break of at least 3%.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure.

The Office Action states Hesse teaches a β -nucleated propylene polymer and asserts compound B includes propylene homopolymers with a stereospecificity index of >98%, and

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would therefore be equivalent to β -nucleated propylene. Applicants respectfully disagree with this assertion for at least the following reasons.

Hesse is directed to singlelayer and multilayer polyolefin foam pipes. Hesse teaches the polyolefin foam is made up of compound A (modified propylene polymer having strain hardening behaviour, i.e. increased stiffness) and compound B (propylene homopolymers and copolymers). Hesse further teaches it is advantageous that compound B also exhibits a high stiffness achieved by compound B having a stereospecificity index of >98%. See [0046] and [0047].

As presented above, Hesse teaches it is advantageous that compound B has a high stiffness. It is well known increasing stereo regularity increases crystallinity. Thus, higher levels of crystallinity result in a greater/higher stiffness. Whereas, reducing the levels of crystallinity results in improved elongation and toughness. See Hertzberg, Chapter 6, page 218-219 (attached). An object of Hesse is to increase the stereoregularity of compound B, thus increasing the stiffness of the polyolefin. For at least these reasons applicants respectfully disagree with the characterization of the propylene homopolymers with a stereospecificity index of >98% taught by Hesse as being equivalent to β -nucleated propylene recited by claim 1.

Additionally, the Office Action further relies on Baren to teach the use of a β -nucleating agent, asserting it is well known to add β -nucleating agent to introduce more β -phase crystallinity to improve the toughness of isotactic polypropylene and it would therefore have been obvious to use the β -nucleating taught by Baren in place of the α -nucleating agent taught by Hesse in order to achieve improved toughness which would also be motivated by a reasonable expectation of success. Applicants respectfully disagree with this assertion for at least the following reasons.

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Baren discusses the different crystal structures of isotactic polypropylene (iPP), i.e. monoclinic (α), hexagonal (β), and triclinic (γ). Baren further teaches the α -form largely occurs in the crystallization of conventional iPP grades and that the β -form is observed only occasionally during crystallization. Baren goes on to teach the addition of a β -nucleating agent to increase the presence of the β -phase of isotactic polypropylene and further teaches the β -phase improves the impact toughness of isotactic polypropylene.

Thus, Baren teaches the β -phase of polypropylene increases toughness. As presented above, toughness is enhanced by a decrease in crystallinity, and therefore a decrease in stiffness. As such, increased toughness results from a decrease in crystallinity, and therefore use of the β -nucleating agent taught by Baren would have an adverse effect on the increased stiffness required by Hesse, teaching away from the increase in stiffness required by Hesse. Thus, one of skill in the art would not be motivated to substitute the α -nucleating agent of Hesse with a β -nucleating agent of Baren when the object of Hesse is to obtain increased stiffness and increased stereospecificity.

Additionally, there is no reasonable expectation of success as observed in Comparative Examples 5 and 6 at page 18. Examples 5 and 6 present compositions of polypropylene without a β -nucleating agent. See Tables 4 and 5, reproduced below.

Table 4

	Example 5 Weight%	Example 6 weight%
Propylene block copolymer, MFR 1.0	70	
Propylene block copolymer MFR 8.0	5	80
Glass microspheres	25	20

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Table 5

Property	Example 5	Example 6
MFR ₂ at 230°C/2.16kg, ISO 1133	0.38	2.5
Density, kg/m ³ ISO 1183	681	722
Tensile stress at yield, MPa, ISO 527	8.7	13
Elongation at break, % ISO 527	0.1	2.2

As observed for Comparative Example 5 (Propylene block copolymer, MFR 1.0; Propylene block copolymer MFR 8.0; Glass microspheres) the MFR₂ at 230°C/2.16kg was 0.38, however the Elongation at break, % was only 0.1. Similar results were also observed for Comparative Example 6. These results show the poor material ductility and flexibility without inclusion of the β -nucleating agent.

Applicants respectfully assert that the present invention is not obvious because there is no suggestion or motivation in either Hesse, Baren or Jarrin, alone or in combination, to obtain the claims syntactic polyolefin coating (i.e. composite polyolefin/filler materials in which the filler comprises microspheres) incorporating a β -nucleating agent to achieve advantageous thermal and mechanical properties. In addition there is no suggestion or motivation in either Hesse, Baren or Jarrin, alone or in combination, to use or substitute β -nucleating agents to obtain a syntactic polyolefin composition displaying an elongation at break of at least 3%. The material thereby being sufficiently ductile with improved flexibility to endure handling, such as coiling or reeling of a pipe without the formation of cracks.

Thus, for at least the reasons discussed above, neither Hesse, Baren nor Jarrin, alone or in combination, render the limitations of independent claim 1 obvious. Applicants assert that

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independent claim 1 is patentably distinguishable over Hesse, Baren, Jarrin, or any combination thereof. Therefore, withdrawal of this rejection with regard to independent claim 1, as well as claims 2-4 and 6-20 that depend from independent claim 1, is respectfully requested.

In view of the above, favorable reconsideration in the form of a notice of allowance is requested. Any questions regarding this communication can be directed to the undersigned attorney, Anne M. Murphy, Reg. No. 54,327, at (612) 371.5267.

Respectfully submitted,

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